

## GEORGIA DEPARTMENT OF TRANSPORTATION OFFICE OF MATERIALS AND RESEARCH

### Standard Operating Procedure (SOP) 10 Quality Assurance for Concrete Plants in Georgia

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#### I. General

District Construction and [Office of Materials and Research](#) personnel are responsible for verifying that Portland Cement Concrete produced for the Department's use meets the applicable specifications. Ready-mix concrete plants and temporary concrete plants (e.g. mobile plants for paving projects) will be inspected and each plant except temporary concrete plants that meets specified minimum requirements will be shown on the Department's [Qualified Products Manual, List of Approved Concrete Plants](#). Concrete produced in accordance with this SOP may be accepted at the job site provided it arrives properly documented and meets job site acceptance criteria (slump, air content, concrete temperature, mixing revolutions, and haul time limitations).

The Area Engineer will have discretion for providing unscheduled surveillance of the producer's batching operations during periods of delivery in order to insure that the plant production controls are adequate.

The [Office of Materials and Research](#) will administer a materials assurance program for approved concrete producers which insures the Department that materials incorporated into concrete mixtures are from approved sources and in substantial compliance with the Specifications. The quality of materials will be verified by testing plant control and progress record samples of materials secured by Department inspectors from plant storage during periods of production of concrete to be used on Departmental projects. The frequency at which materials are sampled and tested will be as established in the Sampling, Testing, and Inspection Manual.

Contractors shall be responsible for materials, concrete mix designs, aggregate moisture determinations, scale weight corrections, batching, weighing, mixing, delivery, and completion and transmission of necessary documentation in the manner and to the degree provided for in the Specifications.

#### II. Prerequisite for Plant Approval

The plant owner or manager shall submit a request in writing to the State Materials and Research Engineer for consideration to be placed on the List of Approved Concrete Plants and the Concrete Plant Application which can be obtained from the Concrete Section at 404-363-7513. After the formal request for plant approval and Concrete Plant Application has been received, the plant owner or manager shall schedule an inspection of the plant facilities with the [Office of Materials and Research](#). Plants with facilities that are found to meet the Department's requirements shall provide the State Materials and Research Engineer with a statement that certifies that all concrete supplied for Department work shall be proportioned in accordance with a design mix approved by the Laboratory and under the provisions outlined in this SOP.

Approved plants must have certified personnel to fulfill the Contractor's responsibility of accurately proportioning concrete. Certified concrete batchers and concrete technicians must demonstrate proficiency in respective areas of responsibilities by successfully completing written and on-the-job examinations administered by the [Office of Materials and Research](#). These certifications will remain valid for five (5) years unless revoked or the certified batcher or technician is inactive in Department work for a period exceeding one year. Applications for examination shall be in writing and directed to the address listed below:

**State Materials and Research Engineer**  
**Department of Transportation**  
**Office of Materials and Research**  
**15 Kennedy Drive**  
**Forest Park, Georgia 30297-2599**

Study guides for the certified technician and batcher exams can be found at <http://www.dot.ga.gov/localgovernment/training/Pages/omr.aspx>.

When all requirements for plant approval have been met, the State Materials and Research Engineer will add the plant to the [List of Approved Concrete Plants](#) and issue certifications which must be displayed in a prominent location in the batching office. Along with the certificates, the letter of approval will include all approved mix designs and a list of certified personnel.

### **III. List of Approved Ready-Mix Concrete Plant**

The [Office of Materials and Research](#) will publish annually a [Qualified Products List of Approved Concrete Plants](#) that are in compliance with this SOP. Only plants on this List will be eligible to supply concrete for Department work. The List will also include the names of individuals authorized to perform specific functions. Any producer may be removed from the List for violation of the Specifications, the use of non-specification materials, for the use of materials from an unapproved source, or for non-compliance with the current SOP 10.

### **IV. Recertification of Plants**

All plants must be recertified annually. A letter from the Concrete Producer requesting recertification will be transmitted to the State Materials and Research Engineer. This request must include for each plant a list of all materials sources, a copy of all mix designs for approval, a renewed scale certification and a list of certified personnel. This request should be received no later than November 15<sup>th</sup> of each year. Upon completion of the requirements for the recertification of a plant, the State Materials and Research Engineer will issue certifications which must be displayed in a prominent location in the batching office. Along with the certificates, the letter of approval will include all approved mix designs and a list of certified personnel.

### **V. Quality Control Rating System**

This system is a measure of each Ready-Mix Concrete Plants Quality Control procedures for concrete produced and delivered to Georgia Department of Transportation construction projects. This rating system will be published semiannually and will include results from the preceding six month period.

All plants which have a rating of less than 70 for the period will be placed on a six month improvement period to improve their Quality Control Rating. During this six month period, the Department will monitor test results from these plants to insure that improvements in Quality Control are being made. At the end of this improvement period all plants which have not improved their rating to 70 or above will be removed from the Department's List Approved Ready-Mix Concrete Plants for a period of not less than 30 days. At the end of this 30 day period consideration will be given to a written request for reinstatement provided quality control procedures are in-place to ensure that a satisfactory control rating of greater than 70 can be achieved.

### **VI. Plant Certification**

The certification of a plant shall be based upon the fulfillment of specified minimum requirements. Plants shall not produce concrete to be used on Departmental projects when the appropriate certified personnel are absent or assigned to other work. All certified personnel shall have on their person a certification card issued by the Department.

Certified plants are defined as those plants with approved Quality control equipment, staffed and operated in a manner that insures concrete is produced in accordance with the Specifications with minimum production inspection by the Area Engineer.

The Engineer may at irregular intervals assign a concrete inspector to observe batching and mixing techniques. All certified plants will meet the following requirements:

## **A. Certified Personnel**

### **Certified Concrete Technician**

Plants shall have a full-time plant employee certified by the Department to be proficient in concrete technology. In the case of Concrete Producers with multiple plant locations a certified Technician can be responsible for a maximum of four locations if approved by the Department. This employee shall have a sound knowledge of the Specifications as they relate to concrete production and shall be capable of conducting tests on concrete and concrete materials in accordance with the Department's Sampling, Testing and Inspection Manual. The Technician's responsibilities shall include supervising the plant's quality control program in a manner that will minimize Department assistance, surveillance of plant operations and problem solving as related to concrete quality and scheduling of concrete deliveries. The Department may call upon the assigned technician to assist in resolving specific problems as deemed necessary. Technicians shall also be responsible for adjustments of concrete mix designs for improved workability and obtain the [Office of Materials and Research's](#) approval of adjustments prior to their use. Technicians shall be qualified and authorized to act in the capacity of the certified batcher in the batcher's absence.

### **Certified Concrete Batcher**

Plants shall have a full-time employee certified by the Department and capable of accurately conducting aggregate surface moisture determinations and establishing correct scale weights for concrete produced for Department use. This employee shall be responsible for conducting sufficient moisture tests to insure that Department concrete is proportioned in accordance with the approved mix design. The certified concrete batcher shall normally be responsible for the batching, documentation and transmission of the certified delivery ticket. The first load for the day delivered to each project, for each class, will also include a copy of the Approved Mix Design sheet identifying mix delivered.

## **B. Certified Laboratory**

All plants shall maintain a field laboratory approved by the [Office of Materials and Research](#) that contains equipment to conduct tests in accordance with procedures in the Sampling, Testing, and Inspection Manual. The equipment shall at least be sufficient to conduct tests for aggregate surface moisture and test for slump, air content and temperature of fresh concrete to maintain adequate control.

## **C. Approved Mix Designs**

All plants are required to maintain current mix designs. Materials and mix design changes must be approved by the Department before use. This approval may be obtained by contacting the appropriate Area Concrete Engineer or the [Office of Materials and Research](#), Concrete Section at 404-363-7513.

All verbal approvals must be followed by a written request within 7 days. Upon receipt of this request, Approved Mix Design sheets will be transmitted by the [Office of Materials and Research](#).

## **D. Measuring Materials**

All scales used for weighing concrete materials shall have an accuracy of plus or minus one percent under operating conditions. It is the owner's responsibility to demonstrate the accuracy of scales at intervals not to exceed six months or as directed by the Engineer.

Cement, Fly Ash and GBF Slag shall be measured by weight on scales to an accuracy of plus or minus one percent of the required weight. Aggregates shall be measured by weight on scales to an accuracy of plus or minus two percent of the required weight of each material. Water shall be measured by weight or volume to an accuracy of plus or minus one percent of the required amount. Admixtures shall be measured by weight or volume to an accuracy of plus or minus three percent of the required amount.

## **E. Mixing Equipment**

### **1. Stationary Mixers**

Stationary mixers shall be capable of combining several concrete ingredients into a homogenous, uniform mass within the specified time when loaded to capacity. In addition they must meet all requirements of Subsection 500.3.02.D of the Specifications.

### **2. Truck Mixers**

Truck mixers shall be capable of combining several concrete ingredients into a homogenous, uniform mass within the specified number of revolutions of the drum. Truck mixers are required to be equipped with approved revolution counting devices in good operating condition. In addition, they must be equipped with

a means of measuring water added at the job site and meet all requirements of Subsection 500.3.02.D of the Specifications.

Specifications require that concrete be mixed at a mixing speed between 70 and 150 revolutions of the drum. All other mixing is done at agitating speed and concrete should be discharged before a total of 300 revolutions. The counters should be set at zero after all materials have been batched and entered the truck mixer. The concrete should then be mixed at mixing speed at the plant to the number of revolutions entered on the batch ticket. All mixing in transit should be at agitating speed.

In the case of Central mixed concrete all mixing is done in a stationary mixer for the prescribed time. This time in minutes should be entered on the batch ticket under Central mix time. After the concrete has been mixed and placed in a transit mixer, the revolution counter should be set at zero. No further mixing of the concrete is required unless water is added at the job site.

#### **F. Delivery Ticket**

All plants shall have a system for transmitting with each delivery of concrete a form which documents specific specification requirements (project number, truck number, time of batching, batch proportions, mixing revolutions, volume of concrete, and quantity of withheld mixing water). Authorized plant personnel shall complete this form and certify the data to be correct. The Department will furnish this form or consider for approval a standard plant form that contains the required data.

Plants equipped with an automated batching system and digital print-outs showing the batch weights can be used in lieu of the standard batch ticket. If this print-out does not have all the required information it can be attached to the standard batch ticket and the missing information added.

### **VII. Project Acceptance of Concrete**

The Engineer may accept concrete at the job site after documentation has been reviewed and sufficient tests have been conducted to assure that concrete meets required criteria. Tests for slump, air content, and concrete temperature should be conducted in accordance with the schedule in Sampling, Testing, and Inspection Manual.

### **VIII. Records and Documentation**

#### **A. Plant Records**

All plant records shall include test reports for cement, test reports for admixture, approved concrete mix designs, approved mix design adjustments, invoices of concrete materials, and form DOT-319. In addition to this, all plants shall keep a record of all slump, air, temperature and moisture tests conducted at the plants. The [Office of Materials and Research](#) will provide the plant with a copy of all test results from materials secured at the plant including cylinder test results.

#### **B. Laboratory Records**

The [Office of Materials and Research](#) will maintain records of all Approved Concrete Plants by name and area. [Office of Materials and Research](#) records will serve as the official documents for materials used. Records shall include aggregate gradations, cement test reports, admixture test reports, approved concrete mix designs, approved mix adjustments and concrete reports (DOT-319).

The [Office of Materials and Research](#) will maintain a record of DOT-319's by project number and a record of test reports for cement, aggregate and admixture by plant name and location.

#### **C. Project Records**

The Area Engineer will maintain records of approved concrete mix designs, approved mix design adjustments and all concrete delivery tickets which accompanies each load of concrete to the job site. The data on the delivery ticket will be used to complete form DOT-319. A completed copy of this form will be submitted to the [Office of Materials and Research](#) within three weeks after placement of the concrete. The [Office of Materials and Research](#) will review, authenticate, and distribute copies of form DOT-319 to the Area Engineer for filing. This form will serve as the acceptance document for the cement, aggregates, admixtures and concrete.

### **IX. Transit Mixer Load**

Each Plant manager shall provide adequate surveillance to insure that no transit mixer is loaded with more than 8 cubic yards (6 cubic meters) of concrete. This requirement includes all transit mixers using state roads, regardless of destination. Transit mixers carrying more than 8 cubic yards (6 cubic meters) to Department of Transportation

projects shall be rejected by the Engineer. Frequent or flagrant load violations will result in removal of the plant from the [List of Approved Concrete Plants](#).

## **X. Open-Top Body Mounted Truck Load**

Each Plant manager shall provide adequate surveillance to insure that no covered open-top body mounted truck (e.g. dump truck, bottom-dump truck, flowboys) exceed the maximum weight load for roads traveled as specified by Georgia Law. Load restrictions will be in accordance with subsection 107.14-Load Restrictions.

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